

G31A-07

ICESat Science Investigator-led Processing System (I-SIPS)



<http://glas.wff.nasa.gov>

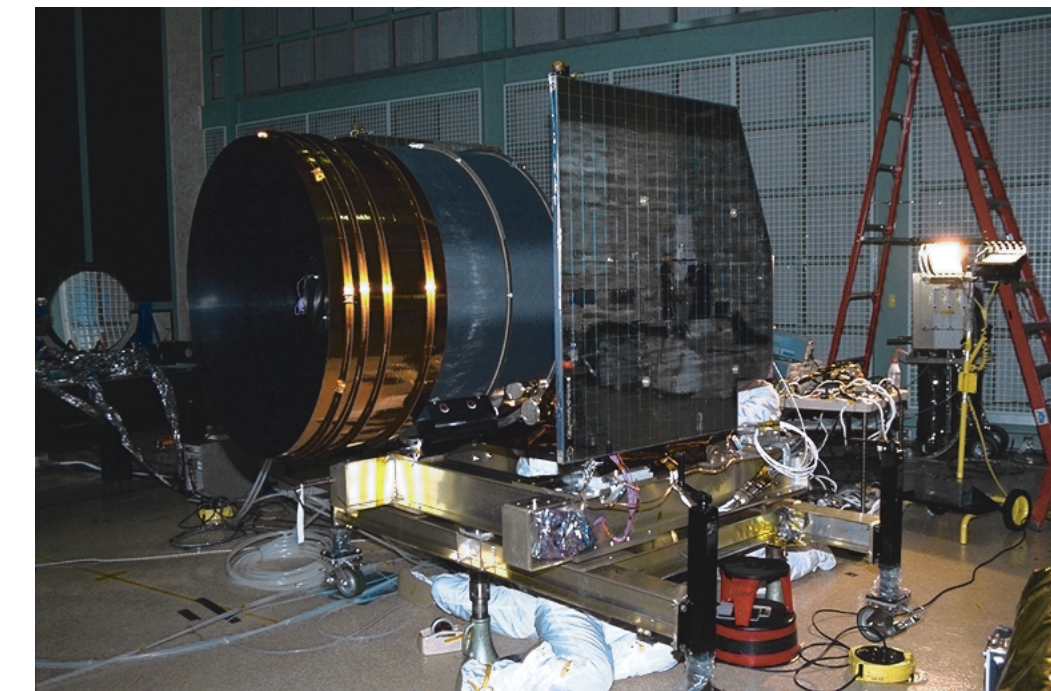
The I-SIPS software consists of two parts, the SDMS (Scheduling and Data Management System) and the GSAS (GLAS Science Algorithm System). The SDMS automatically ingests data, schedules the GSAS processing, tracks processing, archives processing logs, archives data, and distributes data. The GSAS implements the GLAS Science Team-defined algorithms to transform the GLAS raw instrument data into geolocated geophysical data products that are ready to use for scientific applications. The SDMS is applicable to any SIPS or production processing. The GSAS is specifically designed to process the GLAS data but has a core that can be useful to other systems. We will present the I-SIPS SDMS design and capabilities, the GLAS data algorithm processing design, and the resulting GLAS standard data products.

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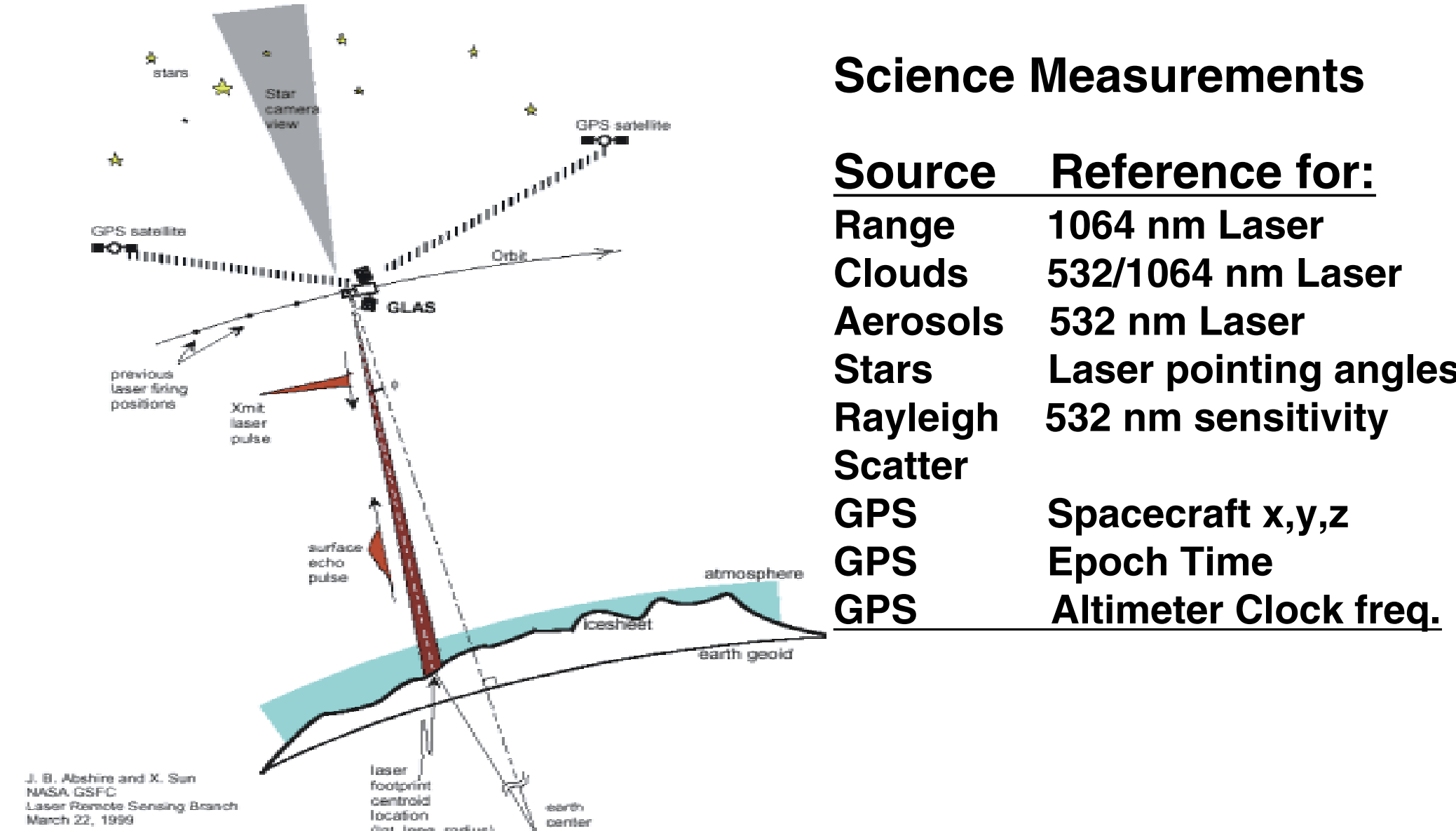
ICESat Spacecraft and GLAS Instrument

The Ice, Cloud and Land Elevation Satellite (ICESat) mission will measure changes in elevation of the Greenland and Antarctic ice sheets as part of NASA's Earth Observing System (EOS) of satellites. The Geoscience Laser Altimeter System (GLAS) on ICESat has a 1064 nm laser channel for surface altimetry and dense cloud heights and a 532 nm lidar channel for the vertical distribution of clouds and aerosols. The GLAS standard data products (SDP) will be produced by the I-SIPS located at the Goddard Space Flight Facility under the direction of the ICESat project scientist following the EOS Science Investigator-led Processing System (SIPS) concept. The National Snow and Ice Data Center (NSIDC) will distribute the SDPs to the general user community. There are sixteen defined SDPs related to measurement of elevations, cloud heights, vertical structure of clouds and aerosols, vegetation canopy heights, sea ice roughness, sea ice thickness, ocean surface elevations, and surface reflectivity. The level 1 and 2 SDPs contain time ordered data stored in 15 separate products in binary integer format in direct access records. There is one defined level 3 HDF-EOS formatted product. The SDP granules vary from a quarter orbit to 14 orbits each.

GLAS Pre-Vibration Testing



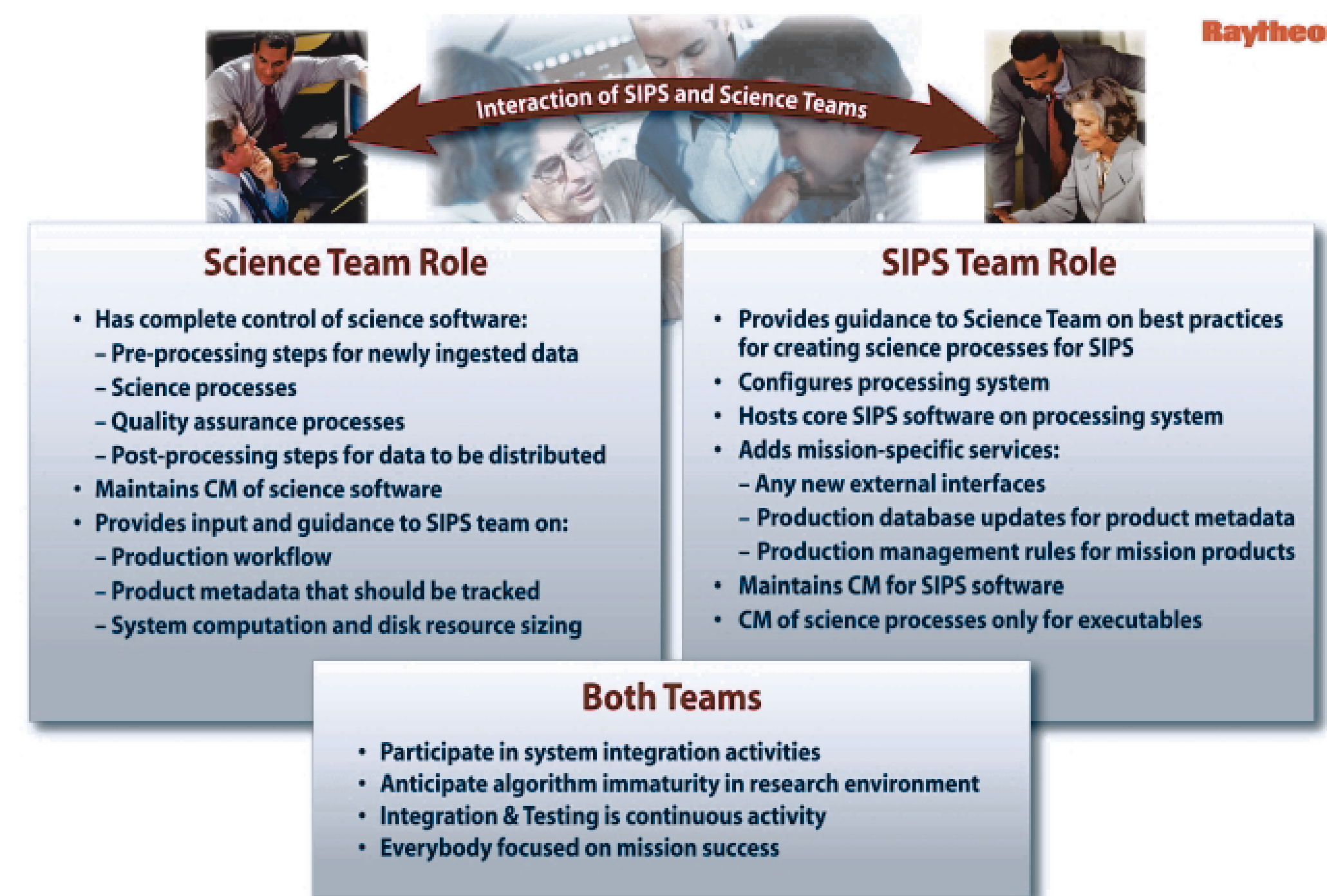
GLAS Science Measurement Overview



SIPS Concept

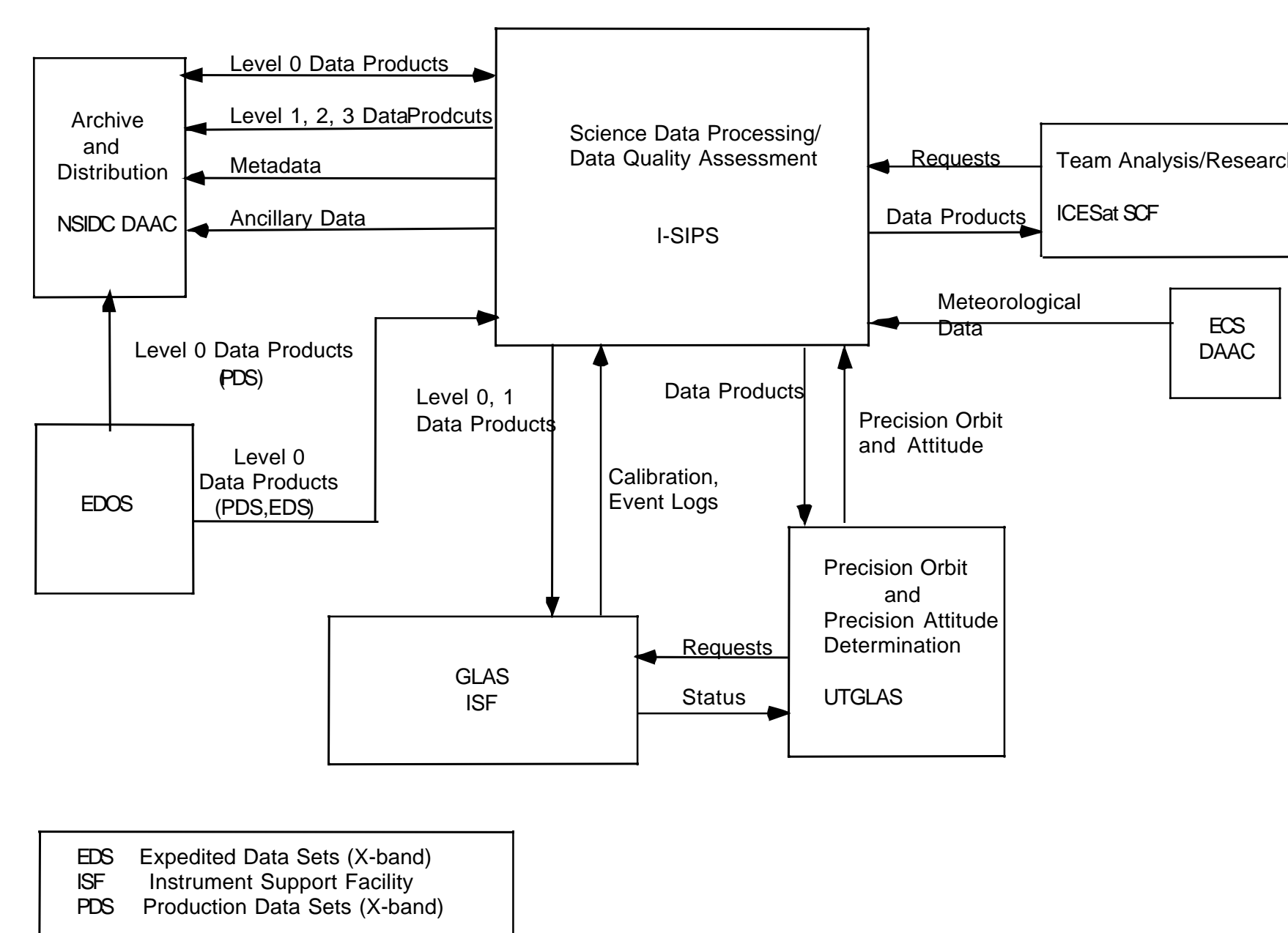
Mission Context for SIPS

- Any mission which requires one or more of the following:
 - generation of science data or data products through ordered processing steps
 - archive and inventory of data/products
 - distribution of data/products to users and external systems through subscriptions and random orders
 - capture of data from external sources
 - implementation of complete operational concept



ICESat SIPS

I-SIPS Interfaces



GSFC Building 22 Exterior



The Computer Facility

The ICESat Science Investigator-led Processing System (I-SIPS) is located at GSFC in Building 22. It houses the I-SIPS and GLAS Science Algorithm software teams and the I-SIPS computing facility which will run the GLAS data processing in a nearly autonomous 24x7 operation.

The I-SIPS Wing of the 1st Floor of Building 22

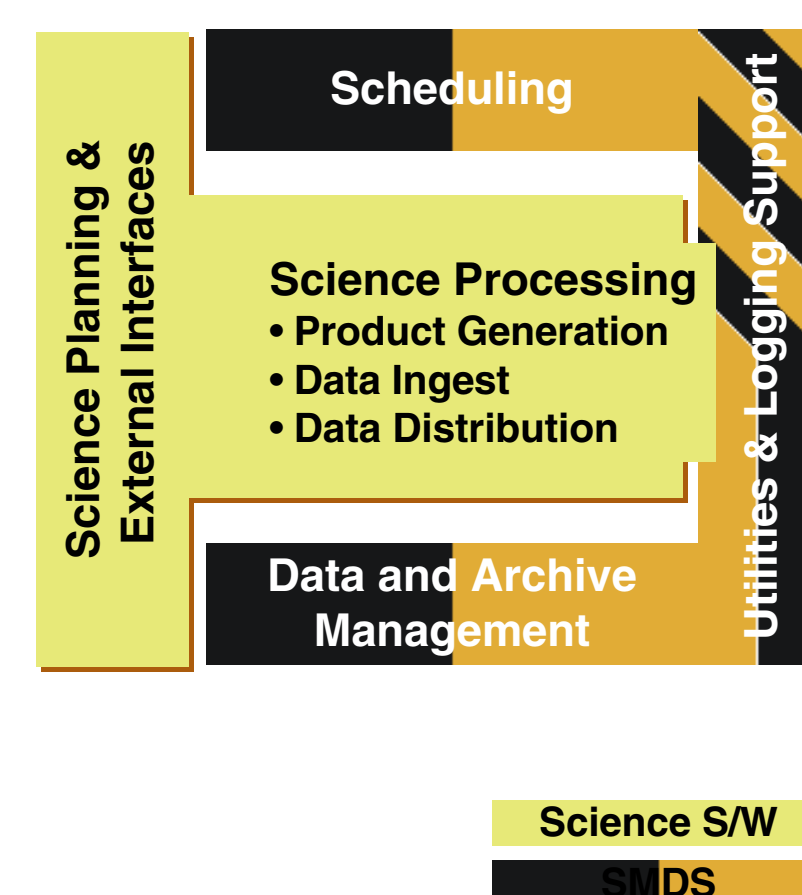
Scheduling Data Management System

ICESat Scheduling and Data Management System (SDMS)

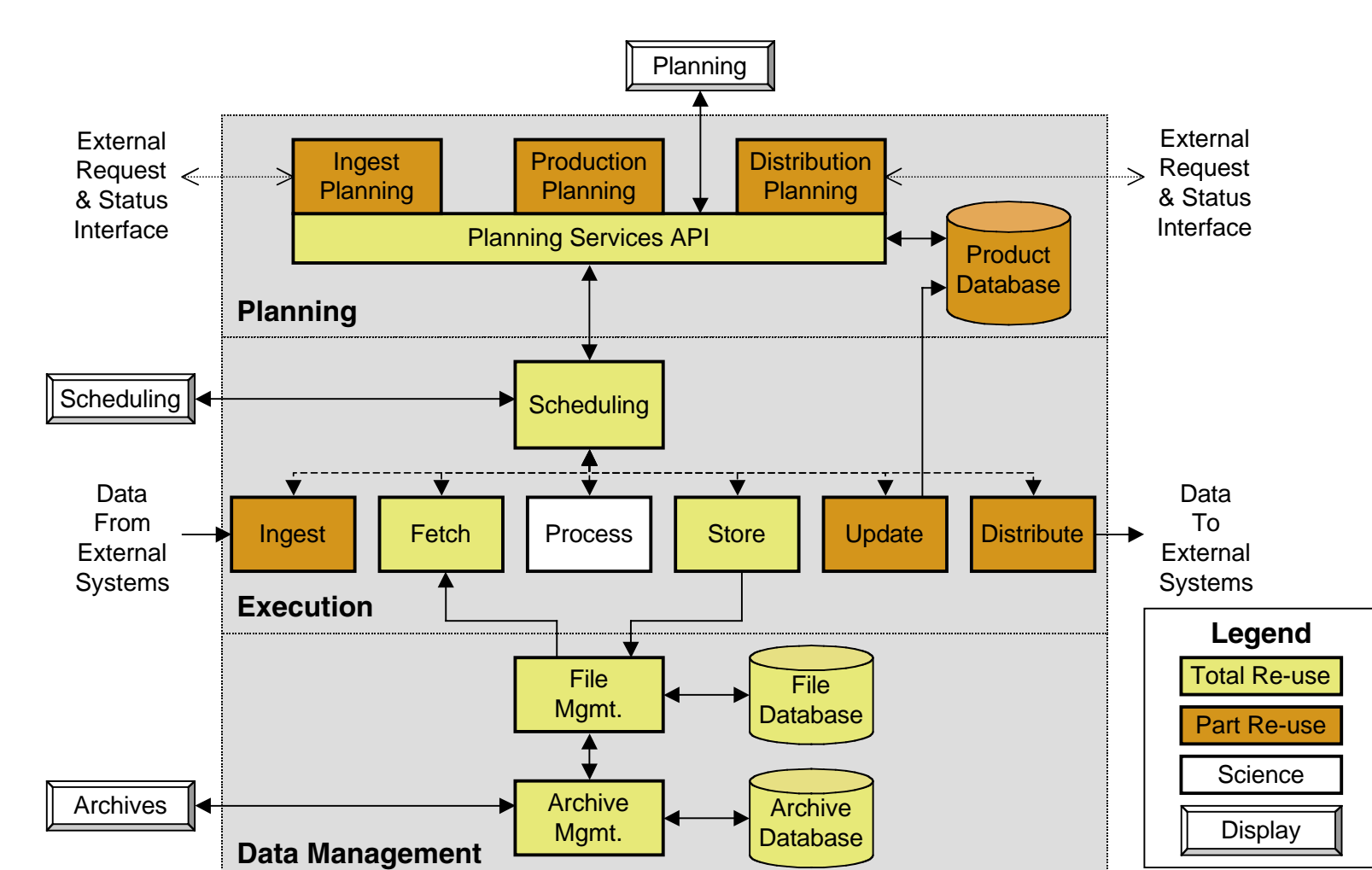
- SDMS Provides Adaptable Infrastructure For Science Information Processing
 - Generalized Architecture – Science and Mission Specific Code Isolated
 - Maintains Clear Lines Between Mission Specific and Reusable Code
 - Adapt and Tailor the Processing System to the Mission
- Allows Independent Development & Testing of the Science Applications
 - Minimizes the Interface between the System and the Science Processing Code
 - Runs Applications Written in Any Language
 - Isolates the Production System Developers From the Science Details

ICESat Specific Software

- Science Processing
 - Run as independent jobs
 - Creates science data product and performs QA functions using algorithms developed by science teams
 - Science Team maintains science applications for life of mission
- Science Planning and Interfaces
 - Define processing rules that automatically schedule jobs
 - Provides database that tracks product history
 - Includes ingest and distribution functions to provide data to external users

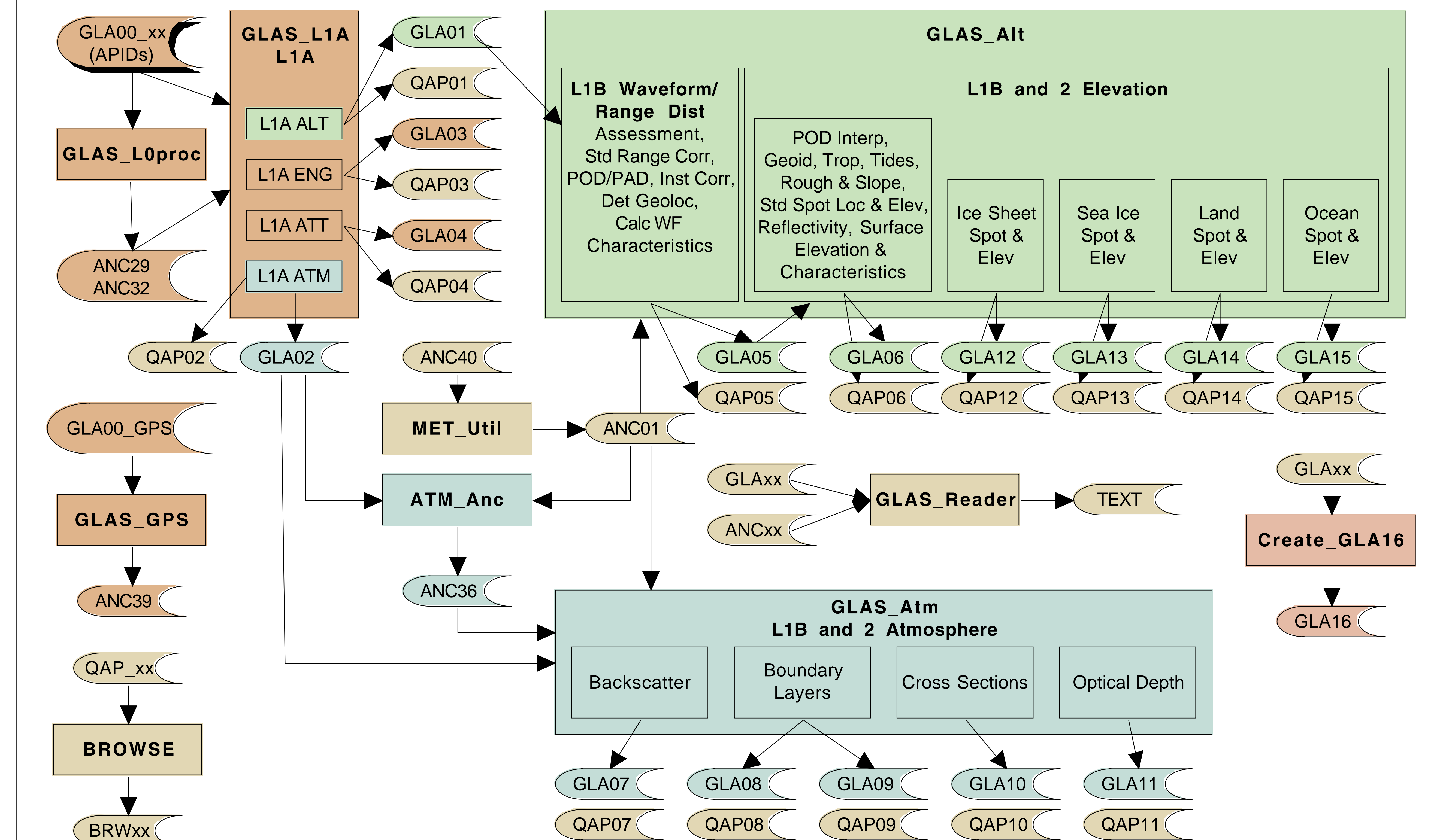


SDMS Architecture and Re-use



ICESat SIPS/GLAS Science Algorithm Software (GSAS)

GSAS: GLAS Science Algorithm Software : Science Data Processing and Utilities



Process	Description	Outputs
GLAS_L1A (L1A)	This process applies instrument related calibrations and equations to the raw GLA00 data to produce data in engineering units. It also computes precise time-tagging information for each laser shot, and quality assurance measurements.	The Level 1A altimeter and atmosphere basic measurements calibrated for instrument effects (GLA01, GLA02), and the pointing and the engineering data (GLA03, GLA04).
GLAS_Alt (Altimetry)	This process evaluates the GLAS waveforms and computes elevation parameters. GLAS_Alt functionality is divided into waveform and elevation processes. The waveform processes compute required range and surface characteristics needed to calculate elevations. The elevation processes compute the required geophysical corrections and corrected elevations using precise pointing and location data.	The Level 1B global altimeter products with precise time and location (GLA05 and GLA06), and the Level 2 regional specific altimetry products (GLA12-15).
GLAS_Atm (Atmosphere)	This process computes the LIDAR 532 and 1064 calibrated attenuated backscatter cross sections and determines cloud and aerosol boundary layers. Optical depths are estimated.	The level 1B backscatter product (GLA07), and the atmospheric level 2 products (GLA08-11)
Utilities (Utility)	The utilities provide the miscellaneous information needed to process the data and to compute corrections.	Various intermediate geophysical files needed for corrections and data calibration files. These are not distributed.
Create_GLA16 (HDF-EOS)	This process selects parameters from a number of elevation and atmosphere products, compresses some of it, and formats it into HDF-EOS.	An interdisciplinary altimeter and atmosphere compressed data product of selected and filtered parameters in the HDF-EOS format.

Note: See poster session G31A-06 for detailed product descriptions

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